REMARKS

This amendment is submitted in reply to the outstanding Final Office Action dated May 4, 2009. Claims 1-18 currently stand rejected. Applicant has amended independent claims 1 and 10 for purposes of improving clarity. No new matter has been added by the amendment.

In light of the amendment and the remarks presented below, Applicant respectfully requests reconsideration and allowance of all now-pending claims of the present invention.

Claim Rejections - 35 USC § 103

Claims 1 and 10 currently stand rejected under 35 U.S.C. §103(a), as being unpatentable over Naito (U.S. Patent No. 6,728,226) in view of Sadri (U.S. Patent No. 6,621,808). Claims 2, 4, 6, 8, 11, 13, 15 and 17 stand rejected under 35 U.S.C. §103(a), as being unpatentable over Naito in view of Sadri and further in view of Tsunehara et al. (U.S. Patent No. 6,907,260, hereinafter "Tsunehara"). Claims 3 and 12 stand rejected under 35 U.S.C. §103(a), as being unpatentable over Naito in view of Sadri and further in view of Jin et al. (U.S. Patent Application Publication No. 2005/0159118 , hereinafter "Jin"). Claims 5 and 14 stand rejected under 35 U.S.C. §103(a), as being unpatentable over Naito in view of Sadri and further in view of O'Neill (U.S. Patent Application Publication No. 2006/0084379). Claims 7 and 16 stand rejected under 35 U.S.C. §103(a), as being unpatentable over Naito in view of Sadri and further in view of Catreux et al. (U.S. Patent Application Publication No. 2002/0183010, hereinafter "Catreux"). Claims 9 and 18 stand rejected under 35 U.S.C. §103(a), as being unpatentable over Naito in view of Sadri and further in view of Otsuka et al. (U.S. Patent Application Publication No. 2005/0026614, hereinafter "Otsuka").

The present application relates to an apparatus and a method for controlling downlink power of a complex cell in a centralized base station system based on remote radio frequency units. Thus, for example, in the downlink direction, all of the remote RF units in the complex cell transmit downlink signals to the same user equipment. For the remote RF unit farther from the UE, its transmitted signal contributes very small to the UE's downlink receiving signal power, and therefore is unnecessary (see page 7, lines 2-7 of the specification of the present application as filed). Thus, embodiments of the present application may weaken the contribution

to the downlink reception signal power of UE made by the remote RF units which are located relatively far away from the UE.

Applicant's prior response was not considered persuasive to the Examiner as the Examiner considered the features discussed by Applicant to be lacking from the claimed invention based on the fact that features Applicant considered to be possessed by the recited claims were not explicitly stated. Applicant has explicitly stated these features and thereby clarified that the present application relates to an apparatus and a method for controlling downlink power of a plurality of radio frequency units to the same user equipment in the centralized base station system based on remote radio frequency units. In the downlink direction, all of the remote RF units in the complex cell transmit downlink signal to the same user equipment. For a remote RF unit farther from the UE, the remote RF unit's transmitted signal contributes very little to the UE's downlink receiving signal power, and therefore is unnecessary (see page 7, lines 2-7 of the description of the present application). Thus, embodiments of the present application may provide for a weakening of the contribution to the downlink reception signal power of the UE made by the remote RF units that are located relatively far away from the UE.

In independent claim 1, the apparatus is described as comprising signal quality measuring means connected to the RAKE receiver, for measuring signal quality of an uplink channel between each radio frequency unit and the same user equipment. The apparatus also includes average signal quality calculating means for calculating average signal quality of each uplink channel according to the measured signal quality and power control means for adjusting transmission power of the downlink channel corresponding to the uplink channel according to the average signal quality, so that the transmission power of the downlink channel corresponding to the uplink channel with a lower average signal quality is relatively lower. That is, in independent claim 1, the average signal quality of the uplink channel is adopted to determine the path loss of the downlink channel, so as to change the transmission power of the respective downlink channel. The principle is that, the uplink and downlink path losses averaged over a period of time are mainly dependent on the spatial distance of the propagation path, and they are approximately equal (see page 10, lines 2-5).

A multicast message communication system is disclosed in Naito, and its object is to allow the quality of a multicast message transmitted from a base station to a plurality of specific mobile stations to be improved in a short time and the power consumption necessary for controlling the transmission powers of mobile stations to be decreased (see column 6, lines 24-29). To solve this technical problem, a transmission power increase request signal is adopted to inform the base station as to whether the base station should increase the transmission power of the multicast messages, and the base station adjusts the transmission power of the multicast signal according to this transmission power increase request signal transmitted by respective mobile stations. When the reception power of the multicast message received by the mobile station (i.e. the reception power in the downlink channel) is lower than a threshold value, the transmission power of the transmission power increase request signal is increased (but if the transmission power increase request signal has already reached a certain level, its transmission power will not be increased). The base station increases the transmission power of the multicast signal in response to reception of the transmission power increase request signal being greater than a second threshold value. On the other hand, when the reception power of the multicast message received by the mobile station (i.e. the reception power in the downlink channel) is greater than the threshold value, the transmission power of transmission power increase request signal is decreased. The base station decreases the transmission power of the multicast signal in response to reception of the transmission power increase request signal being lower than the second threshold value (see column 8, lines 28-39 and column 9, lines 17-44).

Applicant respectfully submits that there are at least four significant points of distinction between Naito and the claimed invention.

1) Contrary to the aim of Naito, the technical problem to be solved by the present application is to control downlink power of a plurality of radio frequency units to the same user equipment (UE). Thus, while Naito focuses on adjusting downlink transmission power of one base station (i.e. one RF unit) to a plurality of UEs (see Naito, col.6, lines 24-29), the claimed invention controls downlink power of multiple RF units to a single UE.

2) The claimed application adjusts transmission power of the downlink channel corresponding to the uplink channel according to average signal quality of an uplink channel

between each radio frequency unit and the same user equipment. Meanwhile, in Naito, though the transmission power increase request signal is in the uplink, it does not represent the average signal quality of an uplink channel between each radio frequency unit and the user equipment. In fact, the transmission power increase request signal represents the signal quality of the downlink channel, and substantially changes conversely with the reception power of the downlink channel. As is well known to those skilled in the art, in a bi-directional channel, the signal qualities in uplink and downlink are positively correlated. Thus, when the average signal quality of the uplink channel received by the base station is high, the average signal quality of the downlink channel is correspondingly high, but the corresponding transmission power increase request signal transmitted by the mobile station will be weak. Therefore, Applicant respectfully submits that the opinion that the transmission power increase request signal transmitted by the mobile station is equivalent to the average signal quality of an uplink channel is incorrect. Furthermore, the transmission power control scheme in independent claim 1 can be achieved simply by calculating the average signal quality of the uplink channel with no need at all to cause the mobile station transmit a specific transmission power increase/decrease signal to the base station, which represents time-cost and bandwidth-cost.

3) In amended independent claim 1, the transmission power of the downlink channel of the radio frequency unit, of which the corresponding uplink channel used by the user equipment has a lower average signal quality, is relatively lower with respect to other radio frequency units. It can be seen that, in independent claim 1, the transmission power of a radio frequency unit far away from the UE will be weakened since the average signal quality of the uplink between such a radio frequency unit and the UE is usually poor in the common sense. To the contrary, signals from a base station in Naito are allowed to be transmitted to the farthest mobile station in the service range of the cell with sufficient quality (col.9, lines 2-4 of Naito). That is to say, the transmission power from the base station to a faraway mobile station should be high enough.

4) In amended independent claim 1, at all times, to the user equipment, the transmission power of the downlink channel of the radio frequency unit, of which the corresponding uplink channel used by said user equipment has a lower average signal quality, is relatively lower with respect to other radio frequency units. To the contrary, Naito provides that it is not always the

case that the transmission power of the downlink channel corresponding to the uplink channel with a lower signal quality is relatively lower with respect to other radio frequency units (see Figs. 4A and 4B of Naito). It can be seen from Fig. 4B of Naito that the power of the transmission power increase request signal (shown as UPLINK in Fig. 4B) increases sometimes and decreases at other times, but the base station strengthens the transmission power of the downlink channel all the time. This is because in Naito, there is only one base station (as shown in Fig.3), and it must ensure all the mobile stations in the range of multicast can receive the messages with a sufficient signal quality. The transmission power should therefore be more increased to cover a more distant mobile station and it is impossible to suppress the transmission power of the base station.

From the above, it can be seen that the technical problems to be solved by the present application and Naito are different, and Naito fails to teach or suggest at least the characterizing feature "adjusting transmission power of the downlink channel corresponding to the uplink channel according to said average signal quality of the uplink channel between each radio frequency unit and the same user equipment, so that at all times, to said user equipment, the transmission power of the downlink channel of the radio frequency unit, of which the corresponding uplink channel used by said user equipment has a lower average signal quality, is relatively lower with respect to other radio frequency units" as provided in independent claim 1.

Sadri fails to cure the above noted deficiency of Naito and is not cited as such. In fact, Sadri relates to the prediction of power levels for each finger in a Rake receiver and is also not related to downlink power control as provided in independent claims 1 and 10. Moreover, although the combination of Sadri and Naito does not meet the claimed invention, even if one were to assume that the respective disclosures of Sadri and Naito met the claimed invention (an assumption with which Applicant expressly disagrees), one of skill in the art would not have any reason to combine Sadri and Naito given that Sadri and Naito are related to completely different technical problems than that of the claimed invention, as indicated above.

The remaining references, namely Tsunehara, Jin, O'Neill, Catreux and Otsuka also fail to cure the above noted deficiencies of Sadri and Naito and are not cited as such. Since the cited references each fail to teach or suggest the above recited feature, any combination of the cited

references also fails to teach or suggest the above recited feature of independent claim 1. Accordingly, independent claim 1 is patentable over the cited references, alone or in combination.

Independent claim 10 includes a similar recitation to that of independent claim 1 in relation to the features described above and is therefore distinguished from the cited references for at least the same reasons provided above for independent claim 1. Claims 2-9 and 11-18 depend either directly or indirectly from respective ones of independent claims 1 and 10, and thus include all the recitations of their respective independent claims. Therefore, dependent claims 2-9 and 11-18 are patentable for at least those reasons given above for independent claims 1 and 10.

Accordingly, Applicant respectfully submits that the rejections of claims 1-18 are traversed.

CONCLUSION

In view of the remarks submitted above, it is respectfully submitted that the present claims are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicants' undersigned attorney to resolve any remaining issues in order to expedite examination of the present invention.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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